FIG 1A. PRODUCTION OF GP88 BY TUMORIGENIC AND NON-TUMORIGENIC CELLS

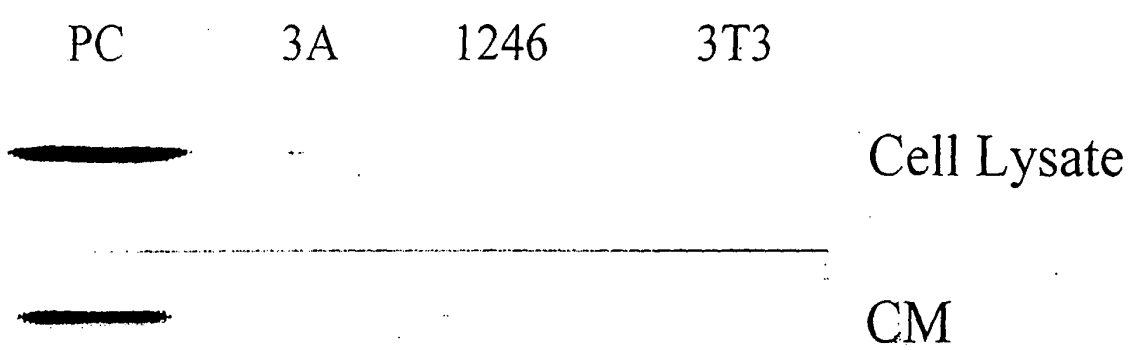


FIG 1B. GP88 mRNA EXPRESSION

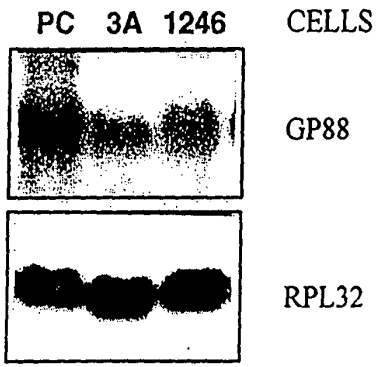
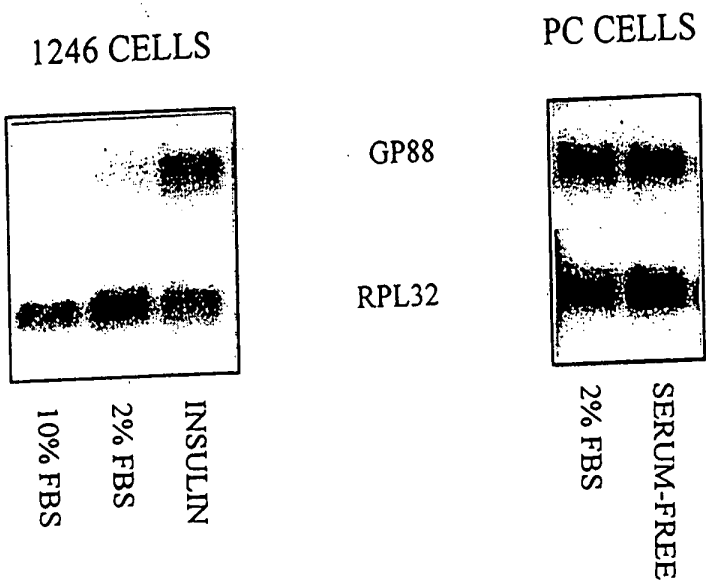


FIG 1C. GP88 mRNA EXPRESSION IN VARIOUS CULTURE CONDITIONS



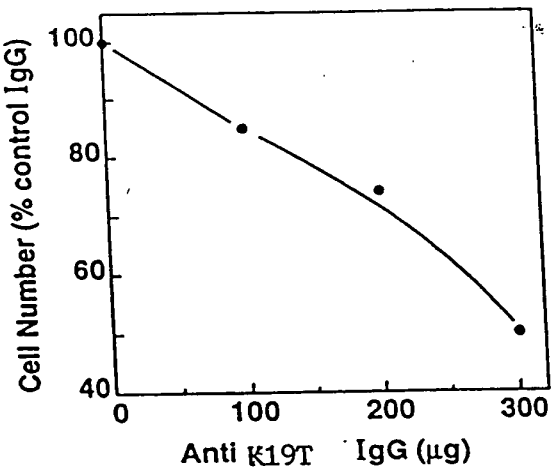
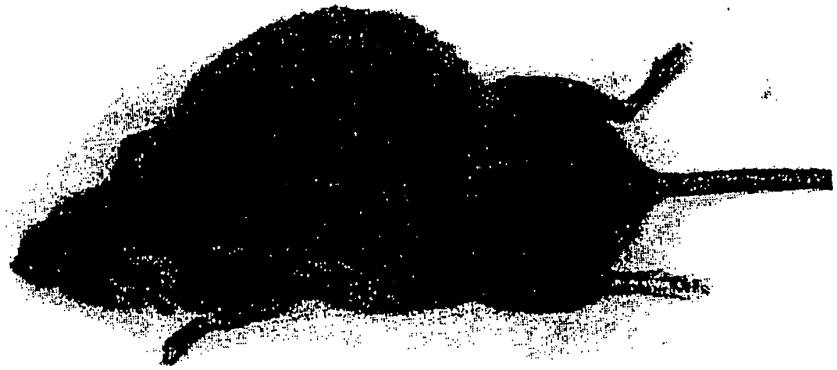

Cell Number (% control IgG)
100
80
60
40
0
100
200
300
Anti K19T IgG (μg)

FIG. 2

FIG 3. ABSENCE OF TUMOR FORMATION IN C3H MICE BY INHIBITION OF GP88 EXPRESSION

GP88 ANTISENSE TRANSFECTED PC CELLS



CONTROL TRANSFECTED PC CELLS

FIG 4. GP88 PROTEIN EXPRESSION IN TUMOR AND SURROUNDING TISSUES

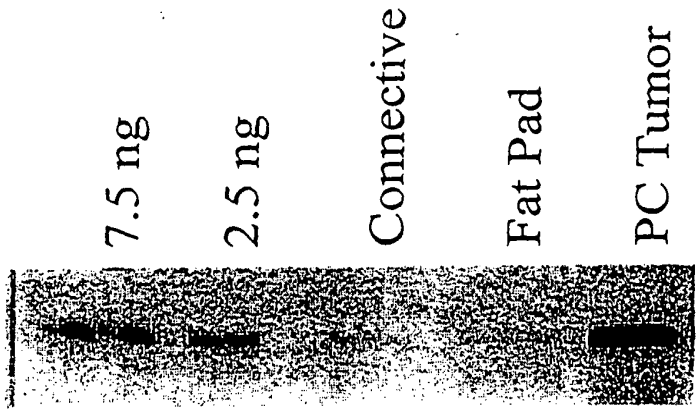
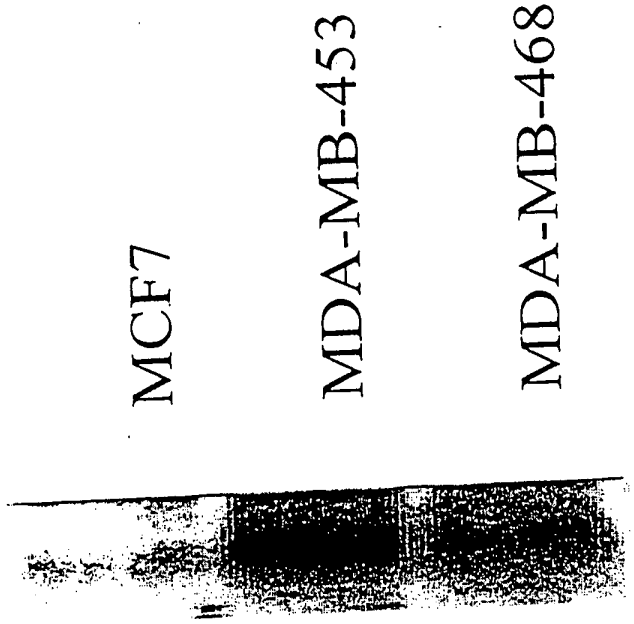


FIG 5. GP88 mRNA EXPRESSION IN ESTROGEN-DEPENDENT AND INDEPENDENT HUMAN MAMMARY CARCINOMA CELLS



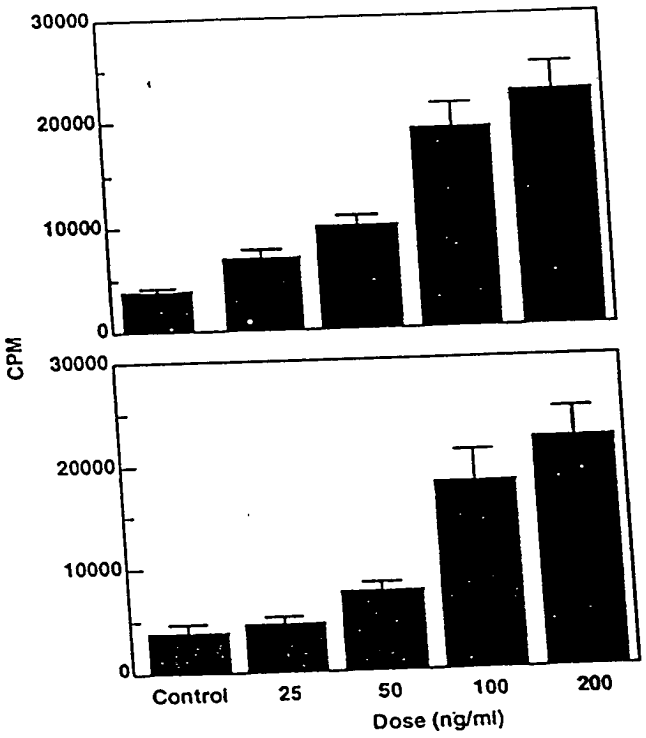
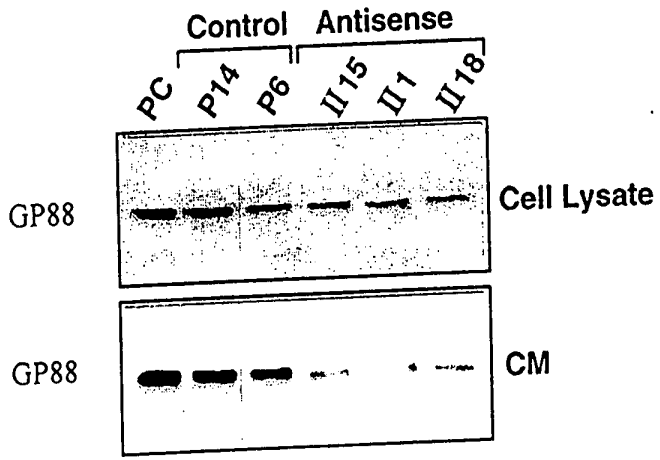

30000
20000
10000
0
CPM
30000
20000
10000
0
Control
25
50
100
200
Dose (ng/ml)

FIG. 6

FIG 7. EXPRESSION OF GP88 IN ANTISENSE AND CONTROL TRANSFECTED PC CELLS



Mouse GP88 cDNA

```
[C GGA CCC CGA CGC AGA CAG ACC ATG TGG GTC CTG ATG AGC TGG CTG      46
                           M   W   V   L   M   S   W   L        8

GCC TTC GCG GCA GGG CTG GTA GCC GGA ACA CAG TGT CCA GAT GGG CAG     94
A   F   A   A   G   L   V   A   G   T   Q   C   P   D   G   Q      24

TTC TGC CCT GTT GCC TGC TGC CTT GAC CAG GGA GGA GCC AAC TAC AGC    142
F   C   P   V   A   C   C   L   D   Q   G   G   A   N   Y   S      40

TGC TGT AAC CCT CTT CTG GAC ACA TGG CCT AGA ATA ACG AGC CAT CAT    190
C   C   N   P   L   L   D   T   W   P   R   I   T   S   H   H      56

CTA GAT GGC TCC TGC CAG ACC CAT GGC CAC TGT CCT GCT GGC TAT TCT    238
L   D   G   S   C   Q   T   H   G   H   C   P   A   G   Y   S      72

TGT CTT CTC ACT GTG TCT GGG ACT TCC AGC TGC TGC CCG TTC TCT AAG    286
C   L   L   T   V   S   G   T   S   S   C   C   P   F   S   K      88

GGT GTG TCT TGT GGT GAT GGC TAC CAC TGC TGC CCC CAG GGC TTC CAC    334
G   V   S   C   G   D   G   Y   H   C   C   P   Q   G   F   H     104

TGT AGT GCA GAT GGG AAA TCC TGC TTC CAG ATG TCA GAT AAC CCC TTG    382
C   S   A   D   G   K   S   C   F   Q   M   S   D   N   P   L     120

GGT GCT GTC CAG TGT CCT GGG AGC CAG TTT GAA TGT CCT GAC TCT GCC    430
G   A   V   Q   C   P   G   S   Q   F   E   C   P   D   S   A     136

ACC TGC TGC ATT ATG GTT GAT GGT TCG TGG GGA TGT TGT CCC ATG CCC    478
T   C   C   I   M   V   D   G   S   W   G   C   C   P   M   P     152

CAG GCC TCT TGC TGT GAA GAC AGA GTG CAT TGC TGT CCC CAT GGG GCC    526
Q   A   S   C   C   E   D   R   V   H   C   C   P   H   G   A     168

TCC TGT GAC CTG GTT CAC ACA CGA TGC GTT TCA CCC ACG GGC ACC CAC    574
S   C   D   L   V   H   T   R   C   V   S   P   T   G   T   H     184

ACC CTA CTA AAG AAG TTC CCT GCA CAA AAG ACC AAC AGG GCA GTG TCT    622
T   L   L   K   K   F   P   A   Q   K   T   N   R   A   V   S     200

TTG CCT TTT TCT GTC GTG TGC CCT GAT GCT AAG ACC CAG TGT CCC GAT    670
L   P   F   S   V   V   C   P   D   A   K   T   Q   C   P   D     216

GAT TCT ACC TGC TGT GAG CTA CCC ACT GGG AAG TAT GGC TGC TGT CCA    718
D   S   T   C   C   E   L   P   T   G   K   Y   G   C   C   P     232

ATG CCC AAT GCC ATC TGC TGT TCC GAC CAC CTG CAC TGC TGC CCC CAG    766
M   P   N   A   I   C   C   S   D   H   L   H   C   C   P   Q     248

GAC ACT GTA TGT GAC CTG ATC CAG AGT AAG TGC CTA TCC AAG AAC TAC    814
D   T   V   C   D   L   I   Q   S   K   C   L   S   K   N   Y     264

ACC ACG GAT CTC CTG ACC AAG CTG CCT GGA TAC CCA GTG AAG GAG GTG    862
T   T   D   L   L   T   K   L   P   G   Y   P   V   K   E   V     280

AAG TGC GAC ATG GAG GTG AGC TGC CCT GAA GGA TAT ACC TGC TGC CGC    910
K   C   D   M   E   V   S   C   P   E   G   Y   T   C   C   R     296

CTC AAC ACT GGG GCC TGG GGC TGC TGT CCA TTT GCC AAG GCC GTG TGT    958
L   N   T   G   A   W   G   C   C   P   F   A   K   A   V   C     312
```

FIG. 8

Mouse GP88 cDNA (continued)

```
TGT GAG GAT CAC ATT CAT TGC TGC CCG GCA GGG TTT CAG TGT CAC ACA   1006
C   E   D   H   I   H   C   C   P   A   G   F   Q   C   H   T     328

GAG AAA GGA ACC TGC GAA ATG GGT ATC CTC CAA GTA CCC TGG ATG AAG   1054
E   K   G   T   C   E   M   G   I   L   Q   V   P   W   M   K     344

AAG GTC ATA GCC CCC CTC CGC CTG CCA GAC CCA CAG ATC TTG AAG AGT   1102
K   V   I   A   P   L   R   L   P   D   P   Q   I   L   K   S     360

GAT ACA CCT TGT GAT GAC TTC ACT AGG TGT CCT ACA AAC AAT ACC TGC   1150
D   T   P   C   D   D   F   T   R   C   P   T   N   N   T   C     376

TGC AAA CTC AAT TCT GGG GAC TGG GGC TGC TGT CCC ATC CCA GAG GCT   1198
C   K   L   N   S   G   D   W   G   C   C   P   I   P   E   A     392

GTC TGC TGC TCA GAC AAC CAG CAT TGC TGC CCT CAG GGC TTC ACA TGT   1246
V   C   C   S   D   N   Q   H   C   C   P   Q   G   F   T   C     408

CTG GCT CAG GGG TAC TGT CAG AAG GGA GAC ACA ATG GTG GCT GGC CTG   1294
L   A   Q   G   Y   C   Q   K   G   D   T   M   V   A   G   L     424

GAG AAG ATA CCT GCC CGC CAG ACA ACC CCG CTC CAA ATT GGA GAT ATC   1342
E   K   I   P   A   R   Q   T   T   P   L   Q   I   G   D   I     440

GGT TGT GAC CAG CAT ACC AGC TGC CCA GTA GGG CAA ACC TGC TGC CCA   1390
G   C   D   Q   H   T   S   C   P   V   G   Q   T   C   C   P     456

AGC CTC AAG GGA AGT TGG GCC TGC TGC CAG CTG CCC CAT GCT GTG TGC   1438
S   L   K   G   S   W   A   C   C   Q   L   P   H   A   V   C     472

TGT GAG GAC CGG CAG CAC TGT TGC CCG GCC GGG TAC ACC TGC AAC GTG   1486
C   E   D   R   Q   H   C   C   P   A   G   Y   T   C   N   V     488

AAG GCG AGG ACC TGT GAG AAG GAT GTC GAT TTT ATC CAG CCT CCC GTG   1534
K   A   R   T   C   E   K   D   V   D   F   I   Q   P   P   V     504

CTC CTG ACC CTC GGC CCT AAG GTT GGG AAT GTG GAG TGT GGA GAA GGG   1582
L   L   T   L   G   P   K   V   G   N   V   E   C   G   E   G     520

CAT TTC TGC CAT GAT AAC CAG ACC TGT TGT AAA GAC AGT GCA GGA GTC   1630
H   F   C   H   D   N   Q   T   C   C   K   D   S   A   G   V     536

TGG GCC TGC TGT CCC TAC CTA AAG GGT GTC TGC TGT AGA GAT GGA CGT   1678
W   A   C   C   P   Y   L   K   G   V   C   C   R   D   G   R     552

CAC TGT TGC CCC GGT GGC TTC CAC TGT TCA GCC AGG GGA ACC AAG TGT   1726
H   C   C   P   G   G   F   H   C   S   A   R   G   T   K   C     568

TTG CGA AAG AAG ATT CCT CGC TGG GAC ATG TTT TTG AGG GAT CCG GTC   1774
L   R   K   K   I   P   R   W   D   M   F   L   R   D   P   V     584

CCA AGA CCG CTA CTG TAA GGA AGG GCT ACA GAC TTA AGG AAC TCC ACA   1822
P   R   P   L   L   *                                           589

GTC CTG GGA ACC CTG TTC CGA GGG TAC CCA CTA CTC AGG CCT CCC TAG   1870
CGC CTC CTC CCC TAA CGT CTC CCC GGC CTA CTC ATC CTG AGT CAC CCT   1918
ATC ACC ATG GGA GGT GGA GCC TCA AAC TAA AAC CTT CTT TTA TGG AAA   1966
GAA GGC TGT GGC CAA AAG CCC CGT ATC AAA CTG CCA TTT CTT CCG GTT   2014
TCT GTG GAC CTT GTG GCC AGG TGC TCT TCC CGA GCC ACA GGT GTT CTG   2062
AGT TTG TAC GCT TTC TGA AAA AAA AAA                              2110
                                                                2137
```

A: Nucleotide sequence of human granulin/epithelin precursor (human GP88).
Human Granulin Genbank M75161$

[cgcaggcaga ccatgtggac cctggtgagc tgggtggcct taacagcagg gctggtggct
ggaacgcggt gcccagatgg tcagttctgc cctgtggcct gctgcctgga ccccggagga
gccagctaca gctgctgccg tccccttctg gacaaatggc ccacaacact gagcaggcat
ctgggtggcc cctgccaggt tgatgcccac tgctctgccg gccactcctg catctttacc
gtctcaggga cttccagttg ctgccccttc ccagaggccg tggcatgcgg ggatggccat
cactgctgcc cacggggctt ccactgcagt gcagacgggc gatcctgctt ccaaagatca
ggtaacaact ccgt]gggtgc catccagtgc cctgatagtc agttcgaatg cccggacttc
tccacgtgct gtgttatggt cgatggctcc tgggggtgct gccccatgcc ccaggcttcc
tgctgtgaag acagggtgca ctgctgtccg cacggtgcct tctgcgacct ggttcacacc
cgctgcatca cacccacggg cacccacccc ctggcaaaga agctccctgc ccagaggact
aacagggcag tggccttgtc cagctcggtc atgtgtccgg acgcacggtc ccggtgccct
gatggttcta cctgctgtga gctgcccagt gggaagtatg gctgctgccc aatgcccaac
gccacctgct gctccgatca cctgcactgc tgcccccaag acactgtgtg tgacctgatc
cagagtaagt gcctctccaa ggagaacgct accacggacc tcctcactaa gctgcctgcg
cacacagtgg gcgatgtgaa atgtgacatg gaggtgagct gcccagatgg ctatacctgc
tgccgtctac agtcgggggc ctggggctgc tgccctttta cccaggctgt gtgctgtgag
gaccacatac actgctgtcc cgcggggttt acgtgtgaca cgcagaaggg tacctgtgaa
caggggcccc accaggtgcc ctggatggag aaggccccag ctcacctcag cctgccagac
ccacaagcct tgaagagaga tgtcccctgt gataatgtca gcagctgtcc ctcctccgat
acctgctgcc aactcacgtc tggggagtgg ggctgctgtc caatcccaga ggctgtctgc
tgctcggacc accagcactg ctgcccccag cgatacacgt gtgtagctga ggggcagtgt
cagcgaggaa gcgagatcgt ggctggactg gagaagatgc ctgcccgccg cggttcctta
tcccacccca gagacatcgg ctgtgaccag cacaccagct gcccggtggg cggaacctgc
tgcccgagcc agggtgggag ctgggcctgc tgccagttgc cccatgctgt gtgctgcgag
gatcgccagc actgctgccc ggctggctac acctgcaacg tgaaggctcg atcctgcgag
aaggaagtgg tctctgccca gcctgccacc ttcctggccc gtagccctca cgtgggtgtg
aaggacgtgg agtgtgggga aggacacttc tgccatgata accagacctg ctgccgagac
aaccgacagg gctgggcctg ctgtccctac gcccagggcg tctgttgtgc tgatcggcgc
cactgctgtc ctgctggctt ccgctgcgca cgcaggggta ccaagtgttt gcgcagggag
gccccgcgct gggacgcccc tttgagggac ccagccttga gacagctgct gtgagggaca
gtactgaaga ctctgcagcc ctcgggaccc cactcggagg gtgccctctg ctcaggcctc
cctagcacct ccccctaacc aaattctccc tggaccccat tctgagctcc ccatcaccat
gggaggtggg gcctcaatct aaggcccttc cctgtcagaa gggggttgag gcaaaagccc
attacaagct gccatcccct ccccgtttca gtggaccctg tggccaggtg cttttcccta
tccacagggg tgtttgtgtg ttgggtgtgc tttcaataaa gtttgtcact ttctt*

B: Amino-acid sequence of human granulin/epithelin precursor (human GP88).

MWTLVSWVALTAGLVAGTRCPDGQFCPVACCLDPGGASYSCCRP
LLDKWPTTLSRHLGGPCQVDAHCSAGHSCIFTVSGTSSCCPFPEAVACGDGHHCCPRG
FHCSADGRSCFQRSGNNSVGAIQCPDSQFECPDFSTCCVMVDGSWGCCPMPQASCCED
RVHCCPHGAFCDLVHTRCITPTGTHPLAKKLPAQRTNRAVALSSSVMCPDARSRCPDG
STCCELPSGKYGCCPMPNATCCSDHLHCCPQDTVCDLIQSKCLSKENATTDLLTKLPA
HTVGDVKCDMEVSCPDGYTCCRLQSGAWGCCPFTQAVCCEDHIHCCPAGFTCDTQKGT
CEQGPHQVPWMEKAPAHLSLPDPQALKRDVPCDNVSSCPSSDTCCQLTSGEWGCCPIP
EAVCCSDHQHCCPQRYTCVAEGQCQRGSEIVAGLEKMPARRGSLSHPRDIGCDQHTSC
PVGGTCCPSQGGSWACCQLPHAVCCEDRQHCCPAGYTCNVKARSCEKEVVSAQPATFL
ARSPHVGVKDVECGEGHFCHDNQTCCRDNRQGWACCPYAQGVCCADRRHCCPAGFRCA
RRGTKCLRREAPRWDAPLRDPALRQLL*

FIG 9

Mouse GP88 protein sequence

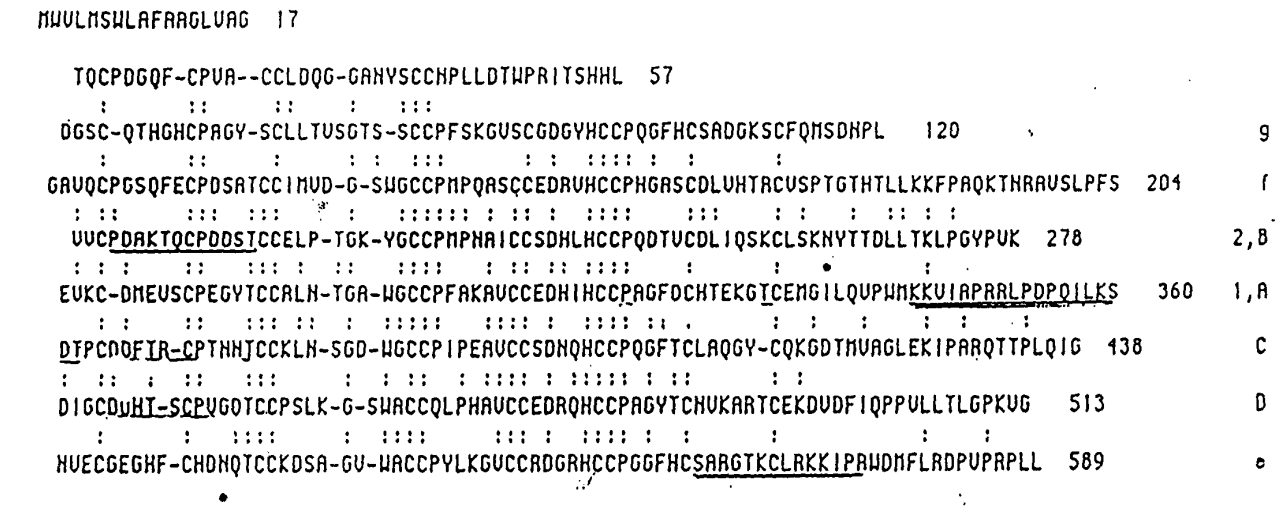


FIG 10

consensus sequence:

C.....C.....CC.....G....CC.....CC.D..HCCP....C.....C

1, 2: mouse epithelin 1, 2.
A, B, C, D, e, f, g: granulin A, B, C, D, E, F, G; N-terminus of granulin A, B, C, D have been sequenced.
Mouse epithelin precursor sequence is from Plowman et al.(1992).

JP88 cDNA Clone in SK

Structure of $pCMV_4$ Expression Vector

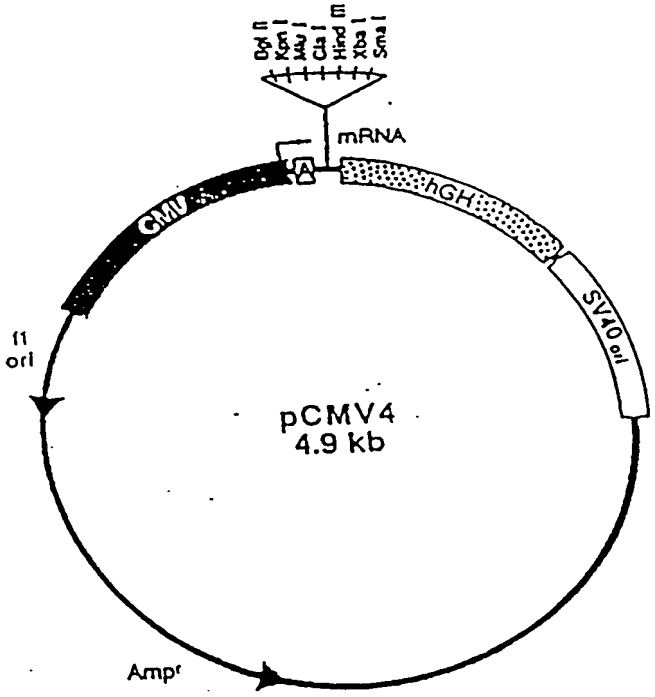


FIG. 11

FIG 12. CROSS-LINKING OF ^{125}I-rGP88 TO CCL64 CELLS

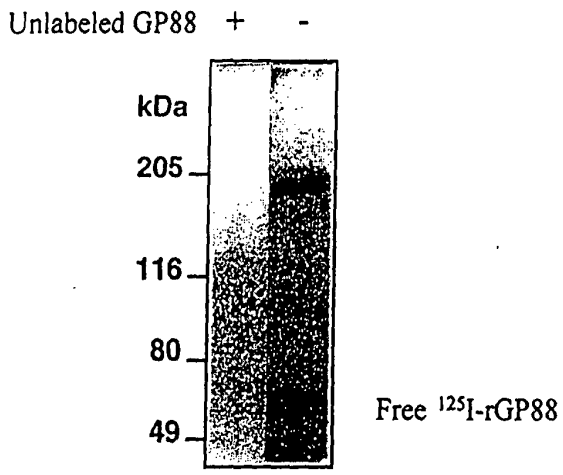
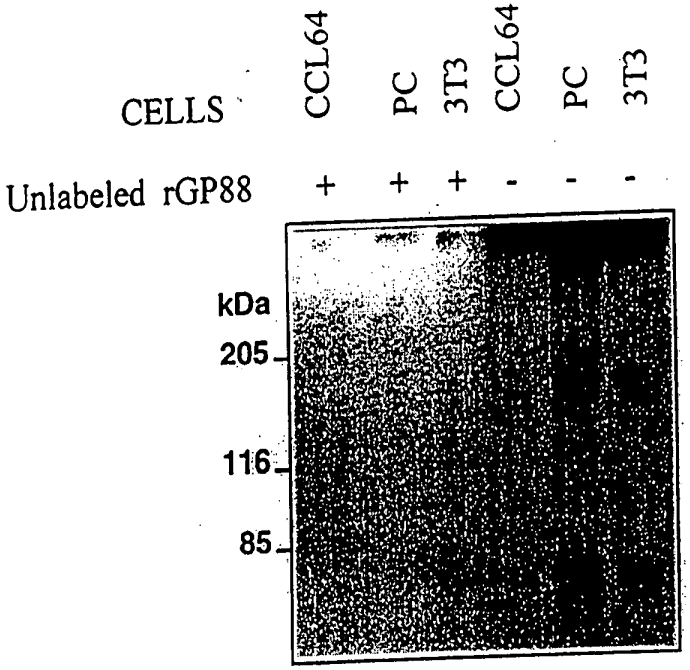


FIG 13. CROSS-LINKING OF ^{125}I-rGP88



Ad Fig 14 GP88 Expression In Non Tumorigenic (MCF 10A) And Malignant (MCF 7, MDA-468) Human Mammary Epithelial Cells

Ad Fig 15 GP88 Expression Is Inhibited By Antisense GP88 cDNA Transfection In Human Breast Carcinoma MDA-468